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Nutritional Information and Characteristics Required by Adolescents and Mothers in Developing Health Applications "MoGiz"

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ABSTRACT
Mobile applications about health have been widely developed but not yet effective as well as suit to user needs. It is because the design process does not involve potential users or user-centered design (UCD). This study aims to obtain information about the needs of groups of adolescents and mothers of children under five on the health application namely MoGiz (Monitoring Gizi). The method uses a qualitative approach through Focus Group Discussion with 6 and 9 informants from group of youths and mothers, respectively. Data analysis was carried out by interpreting the results of a series of transcripts, coding, and arranging the topics and themes found. The results show that teenagers want applications about adolescent health, while mothers of toddlers want applications about toddler health. Both groups expect applications to be small, attractive, containing articles and videos. In conclusion, it is recommended that the application contains health information according to the characteristics of the needs of potential users.
Keywords*: application mobile; health; nutrition; user-centered design*

ABSTRAK
Aplikasi *mobile* tentang kesehatan banyak dikembangkan tetapi belum efektif dengan kebutuhan pengguna. Hal ini karena proses desain tidak melibatkan calon pengguna atau *user-centered design* (UCD). Tujuan penelitian ini untuk mendapatkan informasi tentang kebutuhan kelompok remaja dan ibu balita terhadap aplikasi kesehatan MoGiz (Monitoring Gizi). Metode menggunakan pendekatan kualitatif melalui *Focus Group Discussion* dengan informan remaja dan ibu balita masing-masing 6 dan 9 orang. Analisis data dilakukan dengan menginterpretasikan hasil rangkaian transkrip, pengkodean, dan penyusunan topik dan tema yang ditemukan. Hasil menunjukkan bahwa remaja menginginkan aplikasi tentang kesehatan remaja sedangkan ibu balita menginginkan aplikasi tentang kesehatan balita. Kedua kelompok mengharapkan aplikasi berukuran kecil, menarik, berisi artikel dan video. Aplikasi disarankan berisi informasi kesehatan sesuai karakteristik kebutuhan calon pengguna.
Kata Kunci: aplikasi *mobile*; kesehatan; gizi; *user-centered design*

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INTRODUCTION

Indonesia is faced with various nutritional problems that occur in the adolescent and toddler age groups (Kemenkes RI, 2018). Over nutrition during adolescence is associated with an increased risk of diseases such as kidney disorders, polycystic ovary syndrome, and hypertension in adulthood (Inge *et al.*, 2013). Riskesdas show an increase in obesity, diabetes mellitus, and hypertension from 2007 to 2013 (Kemenkes RI, 2007, 2013). Malnutrition, undernutrition and over-nutrition in children under five are problem those needs to be addressed. However, the prevalence in 2013 and 2018 respectively were 5.7% *vs.* 3.9%; 13.9% *vs.* 13.8% and 4.5% *vs.* 3.1% (Kemenkes RI, 2013, 2018). These, need to be overcome by mass individual health behavior interventions (Gan and Allman-Farinelli, 2011) especially in groups of adolescents and mothers of toddlers. One of the effective health behavior changes promotion interventions is believed throughout mobile application provided in a smartphone (Aker *et al.*, 2016).

Applications mobile is a very potential step to convey health messages because it has many benefits, including relatively low cost, can reach a wider target, can be accessed 24 hours, provides updated at any time, attractive visual display (images, audio, and video), information can be accessed again according to the user's will (Ritterband *et al.*, 2009; Hasson, Brown and Hasson, 2010; Househ, Borycki and Kushniruk, 2014) and most people have easy access to using smartphones (Statista, 2017). Smartphone users worldwide in 2021 will reach 3.8 billion or about 48.33% of the world's population while Indonesia is the 6th highest (Bankmycell, 2022). Indeed, the number of mobile application users in the health sector has increased drastically to reach 247 million people in 2012 (Laird, 2012). They counted almost half of total users. The activities including access information on checking sports activities, calculating food intake, health and nutrition information, and drug prices (Kantar Media, 2012).

Currently, there are about 40,000 health applications meanwhile more than 500 focus on health projects (Sarwar and Soomro, 2013). Yet, existing health applications are less effective due to the design based on the existence of the health system. Most application preparation did not go through a user-centered design (UCD) process, to involve potential users in the development process (Brown *et al.*, 2013). Thus, mobile application makers need to design effective feature to comply the needs of users. The use of UCD or user-centered method to involves prospective users in the process of

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designing help in adjusting user preferences (Schnall *et al.*, 2016). UCD is an interactive system development in the manufacture of software to identify specific group target who will use the application and the need of users toward the application (Rahman, Wahyuni and Pradana, 2020). This capture user desires through depth interviews and focus group discussions (FGD). Hence, this research aims to gain information on the needs of adolescents and mothers of children under five toward features of a health application namely MoGiz (Monitoring Gizi). This research has received an ethical suitability letter from the Ethics Commission of the Faculty of Health Sciences, Universitas Respati Yogyakarta with the number 134.4/FIKES/PL/VII/2020.

METHOD

This qualitative study focuses on exploring the perceptions and desires of adolescents and mothers of children under five using FGD on topic the nutritional information and application characteristics needed. The research was conducted in the Special Region of Yogyakarta, precisely in the Bantul Regency area in May–September 2020. Sampling technique used purposive to adjust research objectives. The inclusion criteria included youths aged 12-25 years or mothers with children under five, willing to become research participants by signing an informed consent, and being present at the time of the FGD. There were 6 adolescences and 9 mothers attended FGDs at the same day but in different hours. The FGD directed in sequences starting from the opening by the facilitator, self-introduction of the facilitator and participants, explanation of the research and FGD rules, signing informed consent, permission to document activities, discussion, summarizing the results, and closing. All process refers to FGD guidance developed by researcher team. The questions discussed included understanding of nutritional status, the importance of measuring nutritional status, obstacles in measuring nutritional status, the need for nutritional applications, and application specifications. Data analysis was carried out through transcript recorded file, coding, categorizing into themes, and interpretation data to gain finding and drawing conclusion.

RESULTS AND DISCUSSION

The result of analysis emerged from FGD in the process of the "MoGiz" application development is described as follow.

Characteristic Respondent

Respondents or informants in the implementation of UCD in this study are six adolescent and mother as can be seen in table 1. The first group (n=6) is generally in the age range of 15-19 years old with

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education level high school. Nine were invited, but three of them absent during data collection. Meanwhile, most of the group of mothers were aged 30–39 years (45.5%). Most mothers of children under five graduated from high schools.

Table 1. Characteristics of respondents

Characteristic	Group	
	Adolescents (n=6)	Mother (n=9)
Age		
15 – 19	4	0
20 – 29	2	3
30 – 39	0	5
40 – 49	0	1
Education		
Junior High school	0	1
Senior High school	4	5
Tertiary School	2	3

Nutritional Information Needs for Adolescents

Knowledge of the Importance of Measuring Adolescent Nutritional Status

All participants stated that it is necessary and important to measure nutritional status on a monthly basis to predict the health condition of adolescents in the future. This is a part of applying balance diet as a prerequisite for getting healthy body. However, they did not know for sure how to measure the correct nutritional status. Their understanding about nutritional status is about food and health issues. Adolescents are said to have good nutritional status if they are rarely sick, physically not too thin and not too fat, and always maintain their diet.

"Balance in diet" (C, junior high school student)

"Same… food and health" (Y, student)
"It is really necessary because to stay healthy you need balanced nutrition" (N, student) "It is necessary, once a month to measure nutritional status and not burdensome (La, junior high school student)

The main obstacle to routinely measuring nutritional status is internal factors including ignoring, procrastinating and event forgetting it's important. Moreover, weight and height measurement equipment at home are unavailable. Measuring nutritional status on a regular basis every month is not burdensome for female adolescents while the counterparts are often not "patient" to record the results. They only need to know the results right away without taking notes. However, no one monitor nutritional status on a regular basis. The usual measurement of nutritional status is only about measuring weight, for example when registering a job

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application and seeking treatment at a health facility or other public facility that has a weight measuring device.

"Equipment" (Lu, student)
"Willingness" (F, high school student)
"From us.. we realized it was important but tomorrow, tomorrow, then finally postponed" (N, student)
"For me, taking note of nutritional status… we are aware it is important, but we do lazy. We delay and postpone and give excuse all the time. Our mindset said it is just ok, nothing happened even feel well as well as healthy. Even though during a weight measurement got increased, for example, my weight was 65 and feel good, then become 70 in the next tomorrow, we do excuse and said to myself to do exercise. Tomorrow I will do jogging. Don't worry about it. No need to take a note. Just to know at that time" (Y, student)

The increase in knowledge in the youth group is in line with the increase in age. Youth girls have higher knowledge scores than boys (62% *vs* 59%) (Sichert-Hellert *et al.*, 2011). Other research also shows that adolescent girls are more concerned about knowledge related to nutrition. In addition, adolescents have been able to make their choices more independently compared to younger ages, whose depends on their parents and families (Naeeni *et al*., 2014).

Experience Downloading Applications

Only one female participant has ever downloaded an android application in the field of nutrition, especially applications that help participants in weight loss programs through dietary regulation. The application contains dietary recommendations according to the user's goals and there is a feature to share experiences from other users who have the same goal to gain motivation for others.

"Health secret, Ms. An application for calorie checking. For example, how much percentage of protein, carbohydrates we consumed. In the beginning I was routine but a bit lazy. At least you know how much we eat, then try to reduce sugar and sweet. It was helpful. There were also testimony stories from succeeded people. They lost many kilos of weight. Tips on how you do that. I am so motivated. But it is dull, Ma'am. It looks monotonous. Just green" (Lu, student)

However, the appearance of the application is not attractive because the color display in the application is monotonous in only one type of color. Meanwhile, teenage boys have never downloaded an android application in the field of nutrition and health. For them, when the body condition is quite healthy (judging by a good weight) then there is no need to download an android application about health.

"The important thing is to be healthy, you don't need to it" (Y, student)

Desired Application Description

The feature or menus in the application that teenagers need more than an explanation about nutritional status, but also answers on the curiosity of teenagers about nutrition and health issues. Details of desired are including: 1) calculation and how to read nutritional status with solutions to overcome user nutritional problems, 2) explanation of health problems based on body parts accompanied by valid solutions from health experts, and 3) tips and tricks to overcome

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adolescent health problems, such as how to lose and gain weight, how to optimize height, adolescent femininity problems, and types of exercise for groups of teenagers.

"It gives enormous influence for female teenagers because their cellphones are mostly good. On the other hand, mother and gentlemen, for example, who are newbie in using android, besides they don't understand, they use it for call and text, particularly whatsapp (wa) application. However, when they are introduced to new application related to them, he wanted to download it. However, when facing it in a large size, and come to mad about can't be downloaded. Then, turn into "this is piye and piye (question in Javanese world on furious expression). What a problem! Do I have to change my cellphone? It's not a solution!" (Y, student)

Participants from the youth group preferred the delivery of material in the application using short, concise, and clear language (can use a combination of images, article writing, and video), as well as attractive color displays. The size of the application should not be too large to memory storage usage. The recommended application size by users is around 20—50 MB.

"With a lot of content, which is complete but with a small size. It might be a bit difficult, yes. so sometimes our needs are simple, we want a lot, but the size is not big, just small" (Y, student)
"Below 50MB, or 20MB times" (Lu, student)
"So that's why I chose to be presented in writing and pictures, if the video had to be downloaded" (N, student)

In order to courage motivation users to access it, it is necessary to make include games which give a *reward* to appreciate achievements. It can be in the form of certificates of achievement that can be uploaded on social media, *vouchers* for healthy food shopping discounts, or *vouchers* for consultation with nutritionists. Participants also stated the need for notification of target achievement to remain and monitor their nutritional status measurement on a regular basis.

"Maybe it's a kind of award like that, Ma'am, what will you get later, you can also get vouchers, or free consultations... if it's a free girl, it's okay" (Lu, student)
"Consultation is okay too" (C, junior high school student)
"Free consultation agrees, he fills in routine data every time he measures his nutrition.. later for how many weeks, oo this is ideal, he has the right to consult to an expert directly" (Y, student)

Nutritional Information Needs for Toddler Mothers

Knowledge of the Importance of Measuring Status Toddler Nutrition

All participants in the group of mothers of children under five agreed that it is necessary to measure the nutritional status of children under five. However, they have a problem because the availability of tools. Mothers of toddlers using roll meter to measure height, that is often used in carpenter. All participants could not measure their weight because they did not have a scale. However, they think it is not necessary because every month they attend nutritional status monitoring at *posyandu* (community service for infant, toddler, and

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kids under five). Hence, most mothers feel regret because *posyandu* close operations in the last few months due to the Covid-19 pandemic.

"Ee, need to know, weight, height and head circumference and further growth.." (N, kindergarten teacher)
"Should be necessary to know the development of children, babies" (Y, housewife)

Measuring nutritional status is considered important by mothers in order to know the development progress of their children. This is normal. Regarding the frequency of measurement, most mothers agreed to measure their weight, height, and head circumference every month. However, they do realize that the measurements of height and head circumference do not change much per month, so it doesn't matter if the measurements are taken every few months.

"For me, height and weight" (T, PAUD teacher)
"Height, weight, head circumference" (N, Kindergarten teacher)
"He doesn't need to have head circumference and height every month, but weight every month is also must… (height). In my opinion, maybe once every 6 months is enough" (La, Kindergarten teacher)
"We use carpenter roll meter. We stick it on the wall, then ask children stand in front or beside the meter. Make a note based on date. Then do same again one month later. But it does not change much even remain identical. I think, if it's 6 months it might be visible but if it's only for 1 month it's not very visible" (Li, housewife)

Mother's knowledge about balanced nutrition is related to the nutritional status of her toddler (Siagian, Carmen M Halisitijayani, 2015). One of the things that affects knowledge is education (Hossain *et al.*, 2014). Other research shows that knowledge about nutrition relates in parallel with education level and age. It is clearly stated that the level of knowledge increases until the age of 35 years and decreases in the age group of more than 36 years (Özdoğan *et al.*, 2012). Other studies also show that nutritional knowledge in the 18-34 year age group is higher than the 35 year old group (Hendrie, Coveney and Cox, 2008). Low education levels, high-class jobs, low nutritional knowledge, and feeding-related behaviors are associated with low food intake in children. The highest food intake and the highest healthy eating behavior scores were found in children with highly educated and unemployed mothers (Al Shookri *et al.*, 2011).

Application Downloading Experience

Most mothers of toddlers have never downloaded and installed health and nutrition related applications. There is only one informant who has ever installed a health and nutrition application that contains information about the development of toddlers according to their age.

"So, for example, what is the development of a 4-year-old child, what can 2 years old do, 3 years old can do" (Li, housewife).

Desired Application

Applications in health and nutrition sector that are expected in the group of mothers of toddlers are those provide solutions for

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problems faced regarding the health of their toddlers. The detailed including: 1) Solutions for toddler health problems in the form of health articles, 2) How to measure valid nutritional status correctly in the form of videos, 3) Online consultation features, and 4) The size of the application is not too large, so that it work well and save *storage* usage.

"I can conclude that this child is malnourished and what is the solution, that's the solution, you know" (M, housewife)

"If I have a solution, it's a consultation. Like for example there are articles. Children at this age, what their needs are, the foods they need, anything can be said" (La, Kindergarten teacher)

"How to use, maybe the right way to measure it. Later here, there will be a difference, what is the correct measurement method. How many kilos here, how many kilos there... so we already know the right way" (Nu, kindergarten teacher)

"There is a consultation" (T, PAUD teacher)

"I personally prefer videos (measurement methods). If you want to cook MP-ASI, what size is it, what is the texture... how many sizes of vegetables, fruit" (Na, housewife)

"So that consideration is memory" (T, PAUD teacher)

"Sometimes we don't have time, so we have to reminded" (Y, housewife)

The user decision-making model to *install* an application can be described as an *software* -based *open source* with several considerations, namely 1) Technology with sub-criteria: *multi-platform, metadata driven, opac (online public access) catalog),* up-to-date, large-scale, multimedia, web-based applications, productivity, reliability, collection inventory, flexibility, security; 2) Users with sub-criteria: ease of use, reports and statistics, completeness of functions, and multi-language; 3) Developer support with sub-criteria: documentation, no maintenance, community support, and independence (Magdalena, 2012). Based on ISO 9241-11 (1998), *usability* is the extent to which a product can be used by certain users to achieve the set targets with certain effectiveness, efficiency, and satisfaction so that *usability* are determined by ease, efficiency, easy to remember, error and safety, and satisfaction (Rahadi, 2014). Another thing that influences users to choose an application is related to the size of the application, consist of the *download* size and the size of the application. The larger *file* will effect to the longer the *download* process. The larger application size take greater space to *install* (Google, 2020).

The weakness in this research is that the data mining process only uses one FGD group for each group of respondents. Ideally, FGDs are conducted in several groups until no new information is obtained (Paramita & Kristiana, 2013). In addition, the respondents are relatively not homogeneous in terms of profession and education level. The implementation of FGD in the group of mothers with toddlers was also less than

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optimal because some mothers brought their toddlers to the location. Even though researchers have anticipated this by providing a place to play, toys, and food for toddlers, but toddlers don't want to be separated from their mothers.

CONCLUSION

User-centered-design is needed in the process of designing health and nutrition applications. Groups of teenagers and mothers of toddlers want an application that contains things directly related to their respective characteristics. In general, both groups wanted applications in the field of health and nutrition that could help provide solutions to problems that are often emerged in that age of group. For example, mothers of toddlers want information about the problem of determining the nutritional status of toddlers and complementary feeding, while teenagers want ways to maintain normal nutritional status. Features, content, size and appearance are important things that must be considered in the application design process. The results of this study can be used as consideration for other researchers who want to develop a health and nutrition application targeting mothers of toddlers and adolescents. In addition, it is necessary to consider a method to conduct FGD on mothers of toddlers who are free from disturbances from their toddlers so that the implementation of FGDs becomes more effective.

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